

A METHOD AND SYSTEM FOR A HIGH-DENSITY PLASMA DEPOSITION
PROCESS FOR FABRICATING A TOP CLAD FOR PLANAR LIGHTWAVE
CIRCUIT DEVICES

5 ABSTRACT OF THE DISCLOSURE

 A method for performing high aspect ratio gap fill during planar
lightwave circuit top clad deposition. A plurality of waveguide cores are formed
on a substrate, the waveguide cores having a plurality of gaps there between.
A cladding layer is formed over the waveguide cores and the substrate using a
10 high-density plasma deposition process. The refractive index of the waveguide
cores are controlled by using a dopant to be higher than the refractive of the
cladding layer. An anneal process is performed on the cladding layer after the
high-density plasma deposition process. The gaps between the waveguide
cores can be smaller than 2 microns. The aspect ratio of the gaps between the
15 waveguide cores can be greater than 3. The high-density plasma deposition
process provides a very high purity USG (undoped silica glass) and BPSG
(Boron Phosphorous silica glass) layers having a uniform refractive index. An
overlying layer of doped silica glass can be deposited over the HDP deposited
layer using PECVD (plasma enhanced chemical vapor deposition) techniques.
20 The doped silica glass can comprise BPSG or GeBPSG (Germanium Boron
Phosphorous silica glass).